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CLAIMS

- 5 1. Process for the meiotic recombination *in vivo* of partially homologous DNA sequences having up to 30% of base mismatches, wherein eukaryotic cells containing the sequences and in which an enzymatic mismatch repair system is defective, are maintained under conditions to effect meiosis.
- 10 2. Process according to claim 1 wherein hybrid genes and their coded proteins are formed.
3. Process according to claim 1 for making hybrid eukaryotic species, comprising providing a set of first eukaryotic cells containing a first DNA sequence and in which an enzymatic mismatch repair system is
- 15 defective; providing a set of second eukaryotic cells containing a second DNA sequence that is partly homologous by having up to 30% base mismatches with the first DNA sequence and in which an enzymatic mismatch repair system is defective; mixing the two sets of cells, to form diploids maintaining the mixture under conditions to effect meiosis, and
- 20 recovering cells of a hybrid eukaryotic species.
4. Process according to claim 1, wherein the eukaryotic cells are of unicellular organisms.
5. Process according to claim 4, wherein the unicellular organisms are yeasts.
- 25 6. Process according to claim 1, wherein the enzymatic mismatch repair systems of the eukaryotic cells are defective by virtue of at least one *mutS* protein and/or at least one *mutL* protein being defective or missing.

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7. Process according to claim 6, wherein the eukaryotic cells containing the partially homologous DNA sequences have *mutS* proteins defective or missing.
8. Process according to claim 7, wherein yeast cells containing the partially homologous DNA sequences have *MLH* genes defective or missing.
9. Process according to claim 1, wherein the eukaryotic cells are of plants.
10. Process according to claim 5, wherein the cells are *pms1* mutants or *msh2* mutants or *pms1 msh2* double mutants.

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